PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2005/002032	21.01.2005	22.01.2004

International Patent Classification (IPC) or both national classification and IPC
C23C2/06, C23C2/12

Applicant
UNIVERSITY OF CINCINNATI

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Teppo, K-M

Telephone No. +49 89 2399-8130

Form (PCT/ISA/237) (Cover Sheet) (January 2004)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2005/002032

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2,4-7,9,12-15
	No:	Claims	1, 3,8, 10,11
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (SEPARATE SHEET)

International application No.
PCT/US2005/002032

Re Item V.

1. Reference is made to the following documents:
   D1 : PATENT ABSTRACTS OF JAPAN, vol. 012, no. 198 (C-502), 8 June 1988 (1988-06-08) -&; JP 63 000447 A (SEIKO INSTR &; ELECTRONICS LTD), 5 January 1988 (1988-01-05)
   D2 : US 2001/051225 A1 (VAN OOIJ WIM J ET AL) 13 December 2001 (2001-12-13)
   D3: US-A-4 448 748 (RADTKE ET AL) 15 May 1984 (1984-05-15)
   D4: EP-A-1 209 245 (GALVAPOWER GROUP N.V) 29 May 2002 (2002-05-29)

2. Document D1 discloses a cleaned steel material that is hot-dipped with the hot dipping bath of alloy consisting of, by weight, 20-24% Al, 0.1-0.5% Si, and the balance Zn (The example shown in the figures e.g. figure 2 show 22% Al, 78 % Zn and 0.2 % Si) with impurities under the conditions of 500-540 °C bath temperature and 1-5 s dipping time. In this way, the hot-dipped steel material excellent in corrosion resistance, workability, adhesive strength, peeling characteristic, and surface luster and having high damping capacity even in case of those with complicated shapes can be obtained.

2.1 INDEPENDENT CLAIM 1
As can be seen from the above, document D1 discloses in combination all the features defined in independent claim 1. Hence the subject-matter of this claim is not new (Article 33(2) PCT).

3. Document D2 discloses a hot-dipped galvanized steel with a coating comprising an inner layer of intermetallic iron aluminum compounds, such as Fe_2Al_5 (which may have some zinc present), and an outer layer of intermetallic zinc aluminum compounds containing from about 17% to about 40% (preferably about 22%, the Zn-Al eutectoid) aluminum (which may have some iron present). (See D2; page 4, paragraph 0051; claims 1, 5)

3.1 INDEPENDENT CLAIM 10
As can be seen from the above, document D2 discloses in combination all the features defined in independent claim 10. Hence the subject-matter of this claim is not new (Article 33(2) PCT).

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3.2 INDEPENDENT CLAIM 12

3.2.1 Document D2, which is considered to represent the most relevant state of the art, discloses a process for hot-dip batch galvanization of a steel article comprising the steps of:

(a) fluxing said steel article by electroless plating on the surface of said steel article a layer of a metal; and

(b) galvanizing said steel article by dipping it in a bath comprising molten zinc and from about 17% to about 40% aluminum;

c) wherein the galvanizing step is carried out for from about 1 to about 5 minutes at a temperature of from about 500 °C to about 600 °C,

d) wherein the galvanizing bath comprises about 22% aluminum (i.e., the Zn-Al eutectoid composition, which is 22.3 % Al in the examples 1 and 4 of D2).

From which the subject-matter of independent claim 12 differs in that an alloy metal is added to the galvanizing bath.

3.2.2 The problem to be solved by the present invention may therefore be regarded as how to further improve the corrosion resistance of coating.

3.2.3 In view of D1, D3 or D4 the solution proposed in claim 12 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:
It is generally known to the person skilled in the art to use small amounts of different alloy metals e.g. Bi, Si or rare-earth metals to further improve the corrosion resistance of the coating, see e.g. D3; col. 4, l. 42-50.

3.2.4 Therefore the features disclosed in D2 and e.g. D3 would be combined by the skilled person, without exercise of any inventive skills in order to solve the problem posed. The proposed solution in independent claim 12 thus cannot be considered inventive (Article 33(3) PCT).

4. DEPENDENT CLAIMS 2-5, 7-9, 11, 13-15
Dependent claims 2-5, 7-9, 11, 13-15 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT). The subject-matter of these claims are known from the listed prior art documents or from their combinations.

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5. DEPENDENT CLAIM 6
The combination of the features of dependent claims 6 is neither known from a single document of the available prior art. However, it is not clear why this particular combination of percentages would provide any special technical effect over what is known e.g. in the combination of D1 and D3 or D4. Thus, no inventive step is at present acknowledged.